

WHAT IS CLAIMED IS:

1. A semiconductor device comprising:

a semiconductor chip having a semiconductor  
element or an integrated circuit formed in the semicon-  
ductor chip, a low dielectric constant insulating film  
5 formed on a surface of the semiconductor chip, and  
a plurality of bump electrodes being provided on the  
surface of the semiconductor chip;

a wiring board having a plurality of connecting  
10 electrodes being electrically connected to the bump  
electrodes; and

a resin molding filled in a space between  
the semiconductor chip and the wiring board, the  
electrically connected bump electrodes and the  
15 connecting electrodes being arranged in the space,  
wherein the resin molding is formed of a resin  
having a flux function and changed from liquid to solid  
when the bump electrodes are in a molten state.

2. A semiconductor device according to claim 1,  
20 wherein a relative dielectric constant of the low  
dielectric constant insulating film is about 3.5 or  
less.

3. A semiconductor device according to claim 1,  
wherein an adhesion strength of the low dielectric  
25 constant insulating film to each of the semiconductor  
chip, the insulating film, and a metal film is 15 J/m<sup>2</sup>  
or less.

4. A semiconductor device according to claim 2,  
wherein an adhesion strength of the low dielectric  
constant insulating film to each of the semiconductor  
chip, the insulating film, and a metal film is  $15 \text{ J/m}^2$   
5 or less.

5. A semiconductor device according to claim 1,  
wherein a coefficient of elasticity of the resin is  
20 MPa or more at normal temperature.

6. A semiconductor device according to claim 1,  
10 wherein the resin molding comprises a first resin layer  
close to the semiconductor chip and a second resin  
layer close to the wiring board, and the second resin  
layer is a resin layer which does not contain a filler.

7. A semiconductor device according to claim 1,  
15 wherein the resin molding comprises a first resin layer  
close to the semiconductor chip, a second resin layer  
close to the wiring board, and a third resin layer  
interposed between the first resin layer and the second  
resin layer, and the third resin layer is a resin layer  
20 which does not contain a filler.

8. A semiconductor device according to claim 1,  
wherein the bump electrodes of the semiconductor chip  
are electrically connected to a plurality of connecting  
electrodes formed on the semiconductor chip, a part of  
25 the connecting electrodes are coated with a passivation  
film comprising at least one layer formed of an organic  
film.

9. A method of manufacturing a semiconductor device, comprising:

forming a plurality of bump electrodes on a surface of a semiconductor chip, in which a semiconductor element or an integrated circuit is formed, with a low dielectric constant insulating film formed on the surface of the semiconductor chip;

interposing a resin, which has a flux function between the semiconductor chip and a wiring board in which a plurality of connecting electrodes are formed;

aligning the bump electrodes and the respective connecting electrodes with the resin interposed therebetween, and pressing the semiconductor chip and the connecting electrodes against each other; and

heating the semiconductor chip and the wiring board to electrically connect the bump electrodes to the respective connecting electrodes, and to form a resin molding formed of the resin to fill a space between the semiconductor chip and the wiring board,

wherein the resin is a resin which changes from liquid to solid when the bump electrodes are in a molten state in connecting of the bump electrodes to the respective connecting electrodes.

10. A method of manufacturing a semiconductor device according to claim 9, wherein a relative dielectric constant of the low dielectric constant insulating film is about 3.5 or less.

11. A method of manufacturing a semiconductor device, according to claim 9, wherein a coefficient of elasticity of the resin is 20 MPa or more at normal temperature.

5        12. A method of manufacturing a semiconductor device, according to claim 9, wherein the heating the semiconductor chip and the wiring board is performed in a reflow furnace, and reflow conditions are a temperature of at least 200°C and a time of at least  
10        60 seconds.

13. A method of manufacturing a semiconductor device, comprising:

forming a plurality of bump electrodes on a surface of a semiconductor chip, in which a  
15        semiconductor element or an integrated circuit is formed, with a low dielectric constant insulating film formed on the surface of the semiconductor chip;

interposing a first resin, which has a flux function, in the vicinity of the semiconductor chip,  
20        between the semiconductor chip and a wiring board in which a plurality of connecting electrodes are formed;

interposing a second resin, which has a flux functions and contains no filler, in the vicinity of the wiring board, between the semiconductor chip and  
25        the wiring board in which the plurality of connecting electrodes are formed;

aligning the bump electrodes and the respective

connecting electrodes with the first and second resins interposed therebetween, and pressing the semiconductor chip and the connecting electrodes against each other; and

5           heating the semiconductor chip and the wiring board to electrically connect the bump electrodes to the respective connecting electrodes, and to form a resin molding formed of the first and second resins to fill a space between the semiconductor chip and the  
10       wiring board,

          wherein the first and second resins are resins which change from liquid to solid when the bump electrodes are in a molten state in connecting of the bump electrodes to the respective connecting  
15       electrodes.

          14. A method of manufacturing a semiconductor device according to claim 13, wherein a relative dielectric constant of the low dielectric constant insulating film is about 3.5 or less.

20           15. A method of manufacturing a semiconductor device, according to claim 13, wherein a coefficient of elasticity of the resin is 20 MPa or more at normal temperature.

          16. A method of manufacturing a semiconductor  
25       device, according to claim 13, wherein the heating the semiconductor chip and the wiring board is performed in a reflow furnace, and reflow conditions are a

temperature of at least 200°C and a time of at least 60 seconds.

17. A method of manufacturing a semiconductor device, comprising:

- 5       forming a plurality of bump electrodes on a surface of a semiconductor chip, in which a semiconductor element or an integrated circuit is formed, with a low dielectric constant insulating film formed on the surface of the semiconductor chip;
- 10       interposing a first resin, which has a flux function, in the vicinity of the semiconductor chip, between the semiconductor chip and a wiring board in which a plurality of connecting electrodes are formed;
- interposing a second resin, which has a flux functions, in the vicinity of the wiring board, between  
15       the semiconductor chip and the wiring board in which the plurality of connecting electrodes are formed;
- interposing a third resin, which has a flux function and contains no filler, between the first  
20       resin and the second resin;
- aligning the bump electrodes and the respective connecting electrodes with the first, second and third  
      resins interposed therebetween, and pressing the semiconductor chip and the connecting electrodes  
25       against each other; and
- heating the semiconductor chip and the wiring board to electrically connect the bump electrodes to

the respective connecting electrodes, and to form a resin molding formed of the first, second and third resins to fill a space between the semiconductor chip and the wiring board,

5            wherein the first, second and third resins are resins which change from liquid to solid when the bump electrodes are in a molten state in connecting of the bump electrodes to the respective connecting electrodes.

10           18. A method of manufacturing a semiconductor device according to claim 17, wherein a relative dielectric constant of the low dielectric constant insulating film is about 3.5 or less.

15           19. A method of manufacturing a semiconductor device, according to claim 17, wherein a coefficient of elasticity of the resin is 20 MPa or more at normal temperature.

20           20. A method of manufacturing a semiconductor device, according to claim 17, wherein the heating the semiconductor chip and the wiring board is performed in a reflow furnace, and reflow conditions are a temperature of at least 200°C and a time of at least 60 seconds.